Remarks

The Office Action dated October 15, 2004 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-22 are pending in this application. Claims 1-22 stand rejected. (Claims 23-27 were cancelled by Examiner's amendment as agreed in a telephone interview with Michael Tersillo on April 19, 2004.)

In accordance with 37 C.F.R. 1.136(a), a one month extension of time is submitted herewith to extend the due date of the response to the Office Action dated October 15, 2004 for the above-identified patent application from January 15, 2005 through and including February 15, 2005. In accordance with 37 C.F.R. 1.17(a)(3), authorization to charge a deposit account in the amount of $120.00 to cover this extension of time request also is submitted herewith. If any further extension is required or if the fee authorization is insufficient, the Commissioner is authorized to consider this as a request for the necessary extension of time and/or charge the necessary fee for entry of this Amendment and the continuing examination of this Application.

Claim 1 of the present application recites a nuclear reactor core in which ***each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same.*** See paragraph [0025]. This feature, among others, has been acknowledged by the Office as being non-obvious in view of Patterson and various other references, as the reasons in the Notice of Allowance previously issued in this Application stated:

> "The instant application is deemed to be directed to a non-obvious improvement over the inventions patented in U.S. Patent Numbers 3,878,870, ***3,892,625***, 4,303,474. The improvement comprises a

> nuclear reactor core with a plurality of fuel assemblies arranged into at least three regions of the said core ***and a means for controlling the flow of coolant through the main coolant channels of the said fuel assemblies in a particular region to be substantially the same,*** and in addition that the said coolant flow through the said fuel assemblies in each of the said regions is different from the said coolant flow through the said fuel assemblies in each other of the said regions." [emphasis added].

The claims allowed in this Notice of Allowance were Claims 1-22. This Notice of Allowance was issued upon full consideration of the Patterson reference. (The Notice of Allowance was withdrawn only after the submission of newly discovered references.) Applicants note that, other than the arrangement of fuel assemblies into three regions of the core, the other differences cited by the Office remain to patentably distinguish the claims of the present invention against the disclosures of the cited references. Without intending to diminish the significance of other patentable differences, herein Applicants will focus primarily on the difference emphasized above.

The Office asserts that Patterson discloses "said core regions configured to specific core coolant flows" at col. 3, lines 18-26. However, Applicant submits that this passage teaches that flows to the various zones may be varied in accordance with selected design goals, not that "each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same," as recited in Claim 1. If the Office is asserting that orifice plates 31 are such means, nowhere in Patterson is it taught or suggested, nor is it inherent in the structures described in Patterson that these plates control flow of coolant so that the flow of coolant through the main coolant flow channels of the

fuel assemblies located in a particular region are substantially the same. Moreover, orifice plates 31 do not control a flow of coolant through the main coolant flow channels.

Yasuyuki, as best understood from the English Language abstract, discloses tripartite flow rate regions 2, 3, and 4, as asserted by the Office. However, although each flow rate in regions 2-4 can be adjusted to an optimum state, there appears to be no teaching or suggestion of "each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same." In fact, if Figure 3 of Yasuyuki represents a pie-shaped region of fuel cells, as Applicants believe (without benefit of a complete English translation), it appears that the flow rates in Yasuyuki in fuel assemblies located in a particular region are ***not*** the same. For example, in what appears to be an outer region denoted by a heavy line (perhaps corresponding to Region 4 of Figure 2), there are numbers that vary from 1.12 to 1.60. If the numbers represent flow rates, it is submitted that these flow rates are not substantially the same, and thus would indicate that in "each main coolant flow channel" in Yasuyuki, there is ***not*** a "means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same."

Thus, as best understood by Applicant, Yasuyuki adds nothing to Patterson to teach or suggest "each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same," as recited in Claim 1.

For the above reasons, it is submitted that Claim 1 is patentable over Patterson in view of Yasuyuki.

Claims 2-12 depend from independent Claim 1. When the recitations of dependent Claims 2-12 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claims 2-12 likewise are patentable over Patterson in view of Yasuyuki.

Claim 13 recites a nuclear reactor core that includes a plurality of fuel assemblies, with each fuel assembly including a lower tie plate and a main coolant flow channel having an inlet, and a plurality of coolant orifices with each coolant orifice including a diameter and located in an inlet of a cooling flow channel. The plurality of fuel assemblies are arranged into at least three regions within the core. ***The diameter of the coolant orifices located in a particular region are substantially the same so that a flow of coolant through the main coolant flow channels of the fuel assemblies located in the particular region are substantially the same,*** and the diameter of the coolant orifices located in each region is different from the diameter of the coolant orifices in each other region so that the flow of coolant through the fuel assemblies in each said region is different from the flow of coolant through the fuel assemblies in each other region.

Patterson does not describe nor suggest a nuclear reactor core as recited in Claim 13. Particularly, Patterson does not describe nor suggest a plurality of coolant orifices located in the inlet of the main coolant flow channel of the fuel assemblies. Rather, Patterson describes orifice plates 31 located in the main flow channel of restraint assemblies 18. Further, Patterson does not describe not suggest that the diameter of the coolant orifices located in a particular region are substantially the same so that a flow of coolant through the main coolant flow channels of the fuel assemblies located in the particular region are substantially the same, and the diameter of the coolant orifices located in each region is different from the diameter of the coolant orifices in

each other region so that the flow of coolant through the fuel assemblies in each said region is different from the flow of coolant through the fuel assemblies in each other region.

Yasuyuki, as best understood from the English Language abstract, discloses tripartite flow rate regions 2, 3, and 4, as asserted by the Office. However, although each flow rate in regions 2-4 can be adjusted to an optimum state, there appears to be no teaching or suggestion of "***said diameter of said coolant orifices located in a particular region are substantially the same so that a flow of coolant through said main coolant flow channels of said fuel assemblies located in the particular region are substantially the same,*** and said diameter of said coolant orifices located in each region is different from the diameter of said coolant orifices in each other region so that the flow of coolant through said fuel assemblies in each said region is different from the flow of coolant through said fuel assemblies in each other region," as claimed in Claim 13. In fact, if Figure 3 of Yasuyuki represents a pie-shaped region of fuel cells, as Applicants believe (without benefit of a complete English translation), it appears that the flow rates in Yasuyuki in fuel assemblies located in a particular region are ***not*** the same, and that ***no*** teaching can therefore be fairly said to be present for coolant orifices located in a particular region having the same diameter. Note, for example, in what appears to be an outer region denoted by a heavy line (perhaps corresponding to Region 4 of Figure 2), there are numbers that vary from 1.12 to 1.60. If the numbers represent flow rates, it is submitted that these flow rates are not substantially the same. It is also not apparent from the Abstract or from the Figures, as best understood by Applicants, that Yasuyuki teaches, suggests, or otherwise adds anything to Patterson regarding "said diameter of said coolant orifices located in each region is different from the diameter of said coolant orifices in each other region so that the flow of coolant through said fuel assemblies in each said region is different from the flow of coolant through said fuel

assemblies in each other region," as it is not clear to Applicants specifically how the flow in each region is regulated.

For the reasons set forth above, Applicants submit that Claim 13 is patentable over Patterson in view of Yasuyuki.

Claims 14-17 depend from independent Claim 13. When the recitations of dependent Claims 14-17 are considered in combination with the recitations of Claim 13, Applicants respectfully submit that Claims 14-17 likewise are patentable over Patterson.

Claim 18 recites a nuclear reactor core that includes a plurality of fuel assemblies, with each fuel assembly including a lower tie plate and a main coolant flow channel having an inlet an inlet; and at least one of a plurality of coolant orifices and a plurality of flow restriction devices. Each coolant orifice includes a diameter and is located in an inlet of a cooling flow channel. Each restriction device is detachably coupled to a lower end of the lower tie plate and includes a plurality of flow openings, with each flow opening having a diameter. The plurality of fuel assemblies are arranged into at least three regions within the core. ***The diameter of the coolant orifices located in a particular region are substantially the same,*** and the diameter of the coolant orifices of each region is different from the diameter of the coolant orifices in each other region. ***The flow restriction devices located in a particular region are sized so that a number of flow openings are the same, and the number of flow openings of the flow restriction devices of each region is different from the number of flow openings of the flow restriction devices of each other region.***

Patterson does not describe nor suggest a nuclear reactor core as recited in Claim 18. Particularly, as explained above, Patterson does not describe nor suggest a plurality of coolant orifices located in the inlet of the main coolant flow channel of the fuel assemblies. Rather,

Patterson describes orifice plates 31 located in the main flow channel of restraint assemblies 18. Further, ***Patterson does not describe not suggest that the diameter of the coolant orifices located in a particular region are substantially the same so that a flow of coolant through the main coolant flow channels of the fuel assemblies located in the particular region are substantially the same,*** and the diameter of the coolant orifices located in each region is different from the diameter of the coolant orifices in each other region so that the flow of coolant through the fuel assemblies in each said region is different from the flow of coolant through the fuel assemblies in each other region. In addition, Patterson does not describe not suggest a plurality of flow restriction devices detachably coupled to a lower end of the lower tie plate and including a plurality of flow openings. Further, Patterson does not describe nor suggest that the flow restriction devices located in a particular region are sized so that a number of flow openings are the same, and the number of flow openings of the flow restriction devices of each region is different from the number of flow openings of the flow restriction devices of each other region. The fuel assemblies of Patterson do not contain flow restriction devices.

Thus, Patterson does not teach or suggest either "said diameter of said coolant orifices located in a particular region are substantially the same, and said diameter of said coolant orifices of each said region is different from said diameter of said coolant orifices in each other region," or "said flow restriction devices located in a particular region are sized so that a number of flow openings are the same, and said number of flow openings of said flow restriction devices of each said region is different from said number of flow openings of said flow restriction devices of each other region," all as recited in Claim 18.

Yasuyuki, as best understood from the English Language abstract, discloses tripartite flow rate regions 2, 3, and 4, as asserted by the Office. However, although each flow rate in

regions 2-4 can be adjusted to an optimum state, there appears to be no teaching or suggestion of " said diameter of said coolant orifices located in a particular region are substantially the same," as claimed in Claim 13. In fact, if Figure 3 of Yasuyuki represents a pie-shaped region of fuel cells, as Applicants believe (without benefit of a complete English translation), it appears that the flow rates in Yasuyuki in fuel assemblies located in a particular region are ***not*** the same. Lacking a full translation of Yasuyuki, it appears that ***nothing*** could be said to be fairly taught about the relative sizes of coolant orifices located in a particular region, or even if such coolant orifices are even discussed in Yasuyuki. Note that, in what appears to be an outer region denoted by a heavy line (perhaps corresponding to Region 4 of Figure 2), there are numbers that vary from 1.12 to 1.60. If the numbers represent flow rates, it is submitted that these flow rates are not substantially the same. Thus, from the Abstract and from the Figures as best understood by Applicants, Yasuyuki teaches, suggests, or otherwise adds anything to Patterson regarding " said diameter of said coolant orifices located in a particular region are substantially the same."

For the reasons set forth above, Applicants submit that Claim 18 is patentable over Patterson in view of Yasuyuki.

Claims 19-22 depend from independent Claim 18. When the recitations of dependent Claims 19-22 are considered in combination with the recitations of Claim 18, Applicants respectfully submit that Claims 19-22 likewise are patentable over Patterson in view of Yasuyuki.

For the reasons set forth above, Applicants respectfully request that the Section 103(a) rejection of Claims 1-22 over Patterson in view of Yasuyuki be withdrawn.

The rejection of Claims 1, 2, 13, and 18 under 35 U.S.C. § 103(a) as being unpatentable over Baxi (US 4,303,474) in view of Yasuyuki is respectfully traversed.

Claim 1 of the present application recites a nuclear reactor core in which ***each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same.*** See paragraph [0025]. This feature, among others, has been acknowledged by the Office as being non-obvious in view of Baxi and various other references, as the reasons in the Notice of Allowance previously issued in this Application stated:

> "The instant application is deemed to be directed to a non-obvious improvement over the inventions patented in U.S. Patent Numbers 3,878,870, 3,892,625, ***4,303,474***. The improvement comprises a nuclear reactor core with a plurality of fuel assemblies arranged into at least three regions of the said core ***and a means for controlling the flow of coolant through the main coolant channels of the said fuel assemblies in a particular region to be substantially the same,*** and in addition that the said coolant flow through the said fuel assemblies in each of the said regions is different from the said coolant flow through the said fuel assemblies in each other of the said regions." [emphasis added].

The claims allowed in this Notice of Allowance were Claims 1-22. This Notice of Allowance was issued upon full consideration of the Baxi reference. (The Notice of Allowance was withdrawn only after the submission of newly discovered references.) Applicants note that, other than the arrangement of fuel assemblies into three regions of the core, the other differences cited by the Office remain to patentably distinguish the claims of the present invention against the disclosures of the cited references. Without intending to diminish the significance of other patentable differences, herein Applicants will focus primarily on the difference emphasized above.

Baxi does not describe nor suggest a nuclear reactor core as recited in Claim 1. Particularly, ***Baxi does not describe nor suggest that that each main coolant flow channel***

further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same, and that the coolant flow through the fuel assemblies in each region is different from the coolant flow through the fuel assemblies in each other region. Rather, Baxi describes that the blanket elements include a flow restrictor device in the main coolant conduit. However, Baxi does not describe nor suggest that the main coolant conduit of the fuel elements include a means of controlling the flow through the conduit.

Yasuyuki, as best understood from the English Language abstract, discloses tripartite flow rate regions 2, 3, and 4, as asserted by the Office. However, although each flow rate in regions 2-4 can be adjusted to an optimum state, there appears to be no teaching or suggestion of "each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same." In fact, if Figure 3 of Yasuyuki represents a pie-shaped region of fuel cells, as Applicants believe (without benefit of a complete English translation), it appears that the flow rates in Yasuyuki in fuel assemblies located in a particular region are ***not*** the same. For example, in what appears to be an outer region denoted by a heavy line (perhaps corresponding to Region 4 of Figure 2), there are numbers that vary from 1.12 to 1.60. If the numbers represent flow rates, it is submitted that these flow rates are not substantially the same, and thus would indicate that in "each main coolant flow channel" in Yasuyuki, there is ***not*** a "means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main

coolant flow channels of the fuel assemblies located in a particular region are substantially the same."

Thus, as best understood by Applicant, Yasuyuki adds nothing to Baxi to teach or suggest "each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same," as recited in Claim 1.

For the above reasons, it is submitted that Claim 1 is patentable over Baxi in view of Yasuyuki.

Claim 2 depends from independent Claim 1. When the recitations of dependent Claim 2 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claim 2 likewise is patentable over Baxi in view of Yasuyuki.

Baxi also does not describe nor suggest a nuclear reactor core as recited in Claim 13. Particularly, does not describe nor suggest a plurality of coolant orifices located in the inlet of the main coolant flow channel of the fuel assemblies. Rather, Baxi describes a restrictor assembly located in the blanket elements and not the fuel elements. Further, Baxi does not describe not suggest that ***the diameter of the coolant orifices located in a particular region are substantially the same so that a flow of coolant through the main coolant flow channels of the fuel assemblies located in the particular region are substantially the same,*** and the diameter of the coolant orifices located in each region is different from the diameter of the coolant orifices in each other region so that the flow of coolant through the fuel assemblies in each said region is different from the flow of coolant through the fuel assemblies in each other region. The restrictor assembly does not include an orifice, but rather a plurality of roughened rods.

Yasuyuki, as best understood from the English Language abstract, discloses tripartite flow rate regions 2, 3, and 4, as asserted by the Office. However, although each flow rate in regions 2-4 can be adjusted to an optimum state, there appears to be no teaching or suggestion of "***said diameter of said coolant orifices located in a particular region are substantially the same so that a flow of coolant through said main coolant flow channels of said fuel assemblies located in the particular region are substantially the same,*** and said diameter of said coolant orifices located in each region is different from the diameter of said coolant orifices in each other region so that the flow of coolant through said fuel assemblies in each said region is different from the flow of coolant through said fuel assemblies in each other region," as claimed in Claim 13. In fact, if Figure 3 of Yasuyuki represents a pie-shaped region of fuel cells, as Applicants believe (without benefit of a complete English translation), it appears that the flow rates in Yasuyuki in fuel assemblies located in a particular region are it appears that the flow rates in Yasuyuki in fuel assemblies located in a particular region are ***not*** the same, and that ***no*** teaching can therefore be fairly said to be present for coolant orifices located in a particular region having the same diameter. Note, for example, in what appears to be an outer region denoted by a heavy line (perhaps corresponding to Region 4 of Figure 2), there are numbers that vary from 1.12 to 1.60. If the numbers represent flow rates, it is submitted that these flow rates are not substantially the same. It is also not apparent from the Abstract or from the Figures, as best understood by Applicants, that Yasuyuki teaches, suggests, or otherwise adds anything to Patterson regarding "said diameter of said coolant orifices located in each region is different from the diameter of said coolant orifices in each other region so that the flow of coolant through said fuel assemblies in each said region is different from the flow of coolant through said fuel

assemblies in each other region," as it is not clear to Applicants specifically how the flow in each region is regulated.

For the reasons set forth above, Applicants submit that Claim 13 is patentable over Baxi in view of Yasuyuki.

Baxi does not describe nor suggest a nuclear reactor core as recited in Claim 18. Particularly, Baxi does not describe nor suggest a plurality of coolant orifices located in the inlet of the main coolant flow channel of the fuel assemblies. Rather, Baxi describes a restrictor assembly located in the blanket elements and not the fuel elements. Further, Baxi does not describe nor suggest that ***the diameter of the coolant orifices located in a particular region are substantially the same so that a flow of coolant through the main coolant flow channels of the fuel assemblies located in the particular region are substantially the same***, and the diameter of the coolant orifices located in each region is different from the diameter of the coolant orifices in each other region so that the flow of coolant through the fuel assemblies in each said region is different from the flow of coolant through the fuel assemblies in each other region. In addition, Baxi does not describe not suggest a plurality of flow restriction devices detachably coupled to a lower end of the lower tie plate and including a plurality of flow openings. Baxi does not describe nor suggest that the flow restriction devices located in a particular region are sized so that a number of flow openings are the same, and the number of flow openings of the flow restriction devices of each region is different from the number of flow openings of the flow restriction devices of each other region. Rather, Baxi describes restrictor devices that are only located in the blanket elements and not the fuel elements. Further, the Baxi restrictor device does not include a plurality of fuel openings, but rather a plurality of roughened rods.

Yasuyuki, as best understood from the English Language abstract, discloses tripartite flow rate regions 2, 3, and 4, as asserted by the Office. However, although each flow rate in regions 2-4 can be adjusted to an optimum state, there appears to be no teaching or suggestion of " said diameter of said coolant orifices located in a particular region are substantially the same," as claimed in Claim 13. In fact, if Figure 3 of Yasuyuki represents a pie-shaped region of fuel cells, as Applicants believe (without benefit of a complete English translation), it appears that the flow rates in Yasuyuki in fuel assemblies located in a particular region are ***not*** the same. Lacking a full translation of Yasuyuki, it appears that ***nothing*** could be said to be fairly taught about the relative sizes of coolant orifices located in a particular region, or even if such coolant orifices are even discussed in Yasuyuki. Note that, in what appears to be an outer region denoted by a heavy line (perhaps corresponding to Region 4 of Figure 2), there are numbers that vary from 1.12 to 1.60. If the numbers represent flow rates, it is submitted that these flow rates are not substantially the same. Thus, from the Abstract and from the Figures as best understood by Applicants, Yasuyuki teaches, suggests, or otherwise adds anything to Patterson regarding " said diameter of said coolant orifices located in a particular region are substantially the same."

For the reasons set forth above, Applicants submit that Claim 18 is patentable over Baxi in view of Yasuyuki.

For the reasons set forth above, Applicants respectfully request that the Section 103(a) rejection of Claims 1, 2, 13, and 18 over Baxi in view of Yasuyuki be withdrawn.

The rejection of Claims 1, 2, 13, and 18 under 35 U.S.C. § 103(a) as being unpatentable over Johansson et al. (DE 3150477A1) in view of Nakamura et al. (U.S. 5,106,575) is respectfully traversed. Claim 1 of the present application recites, among other things, a nuclear reactor core in which ***each main coolant flow channel further includes a means of controlling***

a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same. See paragraph [0025]. Without intending to diminish the significance of other patentable differences, herein Applicants will focus primarily on the difference emphasized above.

The Office asserted that Johansson et al. "discloses an apparatus that is ***inherently capable*** of operating and functioning in the manner claimed." [Emphasis added.] However, Applicants disagree that this is the case. Johansson et al. disclose a plurality of fuel assemblies/ bundles 3, each assembly being surrounded by a flow opening/channel device 1. The Office has asserted that the references also show a lower tie-plate/support structure 2', although 2' actually refers to a set of legs, not a lower tie plate, but to whatever element 2' refers, it is not at a "lower" end of the plurality of fuel assemblies. (See translation at the paragraph spanning pages 3 and 4). The Office further asserted that the fuel assemblies are arranged in a plurality of core flow water distribution regions, and the that core regions are configured to specific core coolant flows by means of a plurality of flow orifices plates/throttling elements comprising a diameter, referring to items 7, 7', 22, 28, and 40.

However, Johansson et al. do not describe nor suggest a nuclear reactor core as recited in Claim 1. Particularly, ***Johansson does not describe nor suggest that that each main coolant flow channel further includes a means of controlling a flow of coolant through the main coolant flow channel so that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same,*** and that the coolant flow through the fuel assemblies in each region is different from the coolant flow through the fuel assemblies in each other region. Rather, Johansson describes merely a throttling

disk 7 or 7' that has is a metal plate with beveled corners and with at least eight, but preferably more (e.g., sixteen) holes. (See first complete paragraph on page 4 of translation.) Little more of relevance is said about the nature of the throttling disks other than that they have a large number of holes and that they are fixed into position, although throttling disk 40 is said to have a larger hole 42, four smaller holes 43, and a slot for passage of reactor coolant. Johansson neither describes nor suggests that "the main coolant conduit of the fuel elements include a means for controlling a flow of coolant through said main coolant flow channel so that the flow of coolant through said main coolant flow channels of said fuel assemblies located in a particular region are substantially the same." Thus, Johansson et al. does not disclose an apparatus that is ***inherently capable*** of operating and functioning in the manner claimed, because there is no means for controlling a flow of coolant through said main coolant flow channel so that the flow of coolant through said main coolant flow channels of said fuel assemblies located in a particular region are substantially the same. More particularly, to whatever extent Johansson et al. teaches that these flows can be set, it is not disclosed that they are set in this manner, nor are means to set it in this manner disclosed.

Nakamura et al. is asserted by the Office to disclose that it is well-known in the art to arrange nuclear cores with a plurality of coolant flow rates based on coolant velocity profiles, and that the flow regions disclosed in Johansson et al. could have been arranged into three zones in order to provide an idealized coolant flow distribution above and in the vicinity of the lower tie plate. However, even assuming, ***arguendo,*** that all these assertions are true, Nakamura et al. still adds nothing to Johansson et al. to teach or suggest "the main coolant conduit of the fuel elements include a means for controlling a flow of coolant through said main coolant flow

channel so that the flow of coolant through said main coolant flow channels of said fuel assemblies located in a particular region are substantially the same."

For the above reasons, it is submitted that Claim 1 is patentable over Johansson et al. in view of Nakamura et al.

Claim 2 depends from independent Claim 1. When the recitations of dependent Claim 2 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claim 2 likewise is patentable over Johansson et al. in view of Nakamura et al.

Johansson et al. also do not describe nor suggest a nuclear reactor core as recited in Claim 13. Particularly, Johansson et al. do not describe nor suggest that ***the diameter of the coolant orifices located in a particular region are substantially the same so that a flow of coolant through the main coolant flow channels of the fuel assemblies located in the particular region are substantially the same,*** and the diameter of the coolant orifices located in each region is different from the diameter of the coolant orifices in each other region so that the flow of coolant through the fuel assemblies in each said region is different from the flow of coolant through the fuel assemblies in each other region. At most, Johansson et al. disclose throttling disks having a large number of holes, but does not teach or suggest that their diameters are substantially the same. Note particularly that throttling disk 40 is said to have a larger hole 42, four smaller holes 43, and a slot for passage of reactor coolant. And nowhere do Johansson et al. teach or suggest that the flow of coolant through the main coolant flow channels of the fuel assemblies located in a particular region are substantially the same.

Nakamura et al. is asserted by the Office to disclose that it is well-known in the art to arrange nuclear cores with a plurality of coolant flow rates based on coolant velocity profiles, and that the flow regions disclosed in Johansson et al. could have been arranged into three zones

in order to provide an idealized coolant flow distribution above and in the vicinity of the lower tie plate. However, even assuming, ***arguendo,*** that all these assertions are true, there is still no teaching or suggestion of "***said diameter of said coolant orifices located in a particular region are substantially the same so that a flow of coolant through said main coolant flow channels of said fuel assemblies located in the particular region are substantially the same,*** and said diameter of said coolant orifices located in each region is different from the diameter of said coolant orifices in each other region so that the flow of coolant through said fuel assemblies in each said region is different from the flow of coolant through said fuel assemblies in each other region," as claimed in Claim 13. Thus, Nakamura et al. adds nothing to the teachings of Johansson et al. to remedy this deficiency.

For the reasons set forth above, Applicants submit that Claim 13 is patentable over Johansson et al. in view of Nakamura et al.

Johansson et al. also does not describe nor suggest that ***the diameter of the coolant orifices located in a particular region are substantially the same so that a flow of coolant through the main coolant flow channels of the fuel assemblies located in the particular region are substantially the same,*** and the diameter of the coolant orifices located in each region is different from the diameter of the coolant orifices in each other region so that the flow of coolant through the fuel assemblies in each said region is different from the flow of coolant through the fuel assemblies in each other region. Johansson et al. do not describe nor suggest that the flow restriction devices located in a particular region are sized so that a number of flow openings are the same, and the number of flow openings of the flow restriction devices of each region is different from the number of flow openings of the flow restriction devices of each other region.

Nakamura et al. is asserted by the Office to disclose that it is well-known in the art to arrange nuclear cores with a plurality of coolant flow rates based on coolant velocity profiles, and that the flow regions disclosed in Johansson et al. could have been arranged into three zones in order to provide an idealized coolant flow distribution above and in the vicinity of the lower tie plate. However, even assuming, ***arguendo,*** that all these assertions are true, there is still no teaching or suggestion of "said diameter of said coolant orifices located in a particular region are substantially the same," as claimed in Claim 13. Thus, Nakamura et al. adds nothing to the teachings of Johansson et al. to remedy this deficiency.

For the reasons set forth above, Applicants submit that Claim 18 is patentable over Johansson et al. in view of Nakamura et al.

For the reasons set forth above, Applicants respectfully request that the Section 103(a) rejection of Claims 1, 2, 13, and 18 over Johansson et al. in view of Nakamura et al. be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Favorable action is respectfully solicited.

Respectfully submitted,

Alan L. Cassel
Registration No. 35,842
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070